

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-19. (Canceled)

20. (Currently Amended) A process for treating a substrate by plasma nitridation ~~for forming an oxynitride film on a surface of the substrate,~~ comprising:

providing the substrate having an oxide film thereon; and

irradiating plasma having an electron temperature of 0.5 to 2.0 eV on the oxide film using a mixed gas comprising a rare gas and nitrogen gas to form an ~~[[the]]~~ oxynitride film, wherein

the plasma is irradiated on the oxide film at a temperature of 250 to 500°C and under a pressure of 7 to 260 Pa,

a nitrogen atom content in the oxynitride film has a distribution such that the maximum value N_s of the nitrogen atom content in the oxynitride film at a surface of the oxynitride film opposite a surface facing the substrate is 10 to 40 atomic percent, and the maximum value N_b of the nitrogen atom content in the oxynitride film at the surface facing the substrate side is 0 to 10 atomic percent, and

the ratio N_s/N_b is 2 or more.

21. (Canceled)

22. (Previously Presented) A process according to claim 20, wherein the plasma is generated using microwave irradiation by using a plane antenna member having a plurality of slots.

23. (Canceled)

24. (Previously Presented) A process according to claim 20, wherein the oxide film is formed by plasma processing or thermal oxidation.

25. (Currently Amended) A process for treating a substrate by plasma nitridation ~~for forming an oxynitride film on a surface of the substrate,~~ comprising:

forming an oxide film on ~~providing the substrate having an oxide film thereon;~~ and

irradiating plasma on the oxide film using a mixed gas comprising a rare gas and nitrogen gas to form an ~~[[the]]~~ oxynitride film, wherein

the plasma is irradiated on the oxide film at a temperature of 250 to 500°C and under a pressure of 7 to 260 Pa,

a nitrogen atom content in the oxynitride film has a distribution such that ~~wherein~~ N_s is the maximum value N_s of the nitrogen atom content in the oxynitride film at a surface of the oxynitride film opposite a surface facing the substrate, ~~and~~ N_b is 10 to 40 atomic percent, and the maximum value N_b of the nitrogen atom content in the oxynitride film at the surface facing the substrate side is 0 to 10 atomic percent, and

the ratio N_s/N_b is 2 or more.

26. (Canceled)

27. (Previously Presented) A process according to claim 25, wherein the plasma is generated using microwave irradiation by using a plane antenna member having a plurality of slots.

28. (Previously Presented) A process according to claim 25, wherein the ratio N_s/N_b is 4 or more.

29. (Currently Amended) A process for forming a gate oxynitride film, comprising:

providing a substrate having an oxide film thereon; and

irradiating plasma having density of 1×10^{10} to $5 \times 10^{12}/\text{cm}^3$ and an electron temperature of 0.5 to 2.0 eV on the oxide film using a mixed gas comprising a rare gas and nitrogen gas to form the oxynitride film, wherein

the plasma is irradiated on the oxide film at a temperature of 250 to 500°C and under a pressure of 7 to 260 Pa,

a nitrogen atom content in the oxynitride film has a distribution such that the maximum value N_s of the nitrogen atom content in the oxynitride film at a surface of the oxynitride film opposite a surface facing the substrate is 10 to 40 atomic percent, and the maximum value N_b of the nitrogen atom content in the oxynitride film at the surface facing the substrate side is 0 to 10 atomic percent, and

the ratio N_s/N_b is 2 or more.

30. (Canceled)

31. (Previously Presented) A process according to claim 29, wherein the plasma is generated using microwave irradiation by using a plane antenna member having a plurality of slots.

32. (Canceled)

33. (Canceled)